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ABSTRACT

This research analyzed the yield of degree graduates from teacher preparation programs for the national teaching force in public schools. Estimates were obtained for the percentage of such graduates who: (1) entered public school teaching soon after graduation; (2) delayed entering public school teaching for one or more years after graduation; and (3) already held public school teaching positions at the time of degree completion and then continued as public school teachers. The yield of degree graduates from teacher preparation programs was examined separately for special education and for general education. The findings pertain to 1990 graduates from teacher preparation programs as a source of supply for public schools during the 1990-91 year. The findings were derived from two national database compiled by the National Center for Education Statistics: the Integrated Postsecondary Education Data System and the Schools and Staffing Survey. In 1990, there were approximately 15,400 degree graduates in special education and 130,900 in general education. The overall yield of recent graduates entering the teaching force was 81 percent in special education and 57 percent in general education. It was concluded that the production of degree graduates from teacher education programs in special education has been insufficient to meet the demand, and that the overall production of general education teachers has not been excessive. (Contains 16 references.) (JLS)

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THE PRODUCTION OF DEGREE GRADUATES BY TEACHER PREPARATION PROGRAMS IN SPECIAL AND GENERAL EDUCATION: TOO MUCH OR NOT ENOUGH?[1]

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EXECUTIVE SUMMARY

Although colleges and universities in the United States have graduated annually about 150,000 bachelor's and master's degree students from teacher preparation programs, there have been serious national shortages of qualified teachers in selected fields as diverse as science education and special education. It is not known, however, whether these shortages are due to an insufficient production of degree graduates by teacher preparation programs or due to the unwillingness of many such graduates to accept available teaching positions. The purpose of this research was to analyze the yield of degree graduates from teacher preparation programs for the national teaching force in public schools. Estimates were obtained for the percentage of such graduates who (a) entered public school teaching soon after graduation, (b) delayed entering public school teaching for one or more years after graduation, and (c) already held public school teaching positions at the time of degree completion and then continued as teachers. In view of widespread concerns about shortages of special education teachers, the yield of degree graduates from teacher preparation programs was examined separately for special education and for general education.

The main findings, as listed below, pertain to 1990 graduates from teacher preparation programs as a source of supply for public schools during the 1990-91 year. The findings were derived from two national data bases compiled by the National Center for Education Statistics, USDE: the Integrated Postsecondary Education Data System and the Schools and Staffing Survey. All findings reported represent the best available national estimates and should therefore be interpreted as such.

1. Numbers of Degree Graduates from Teacher Preparation Programs: There were approximately 15,400 degree graduates from teacher preparation programs in special education in 1990, and approximately 130,900 degree graduates from such programs in general education. The numbers of degree graduates in both fields have increased substantially since teacher production reached a low point during the mid-1980s.

2. Degrees Awarded by Teacher Preparation Programs: Master's degree graduates in special education were equivalent in number to bachelor's degree graduates while, in general education, master's degree graduates were considerably less than half the number of bachelor's degree graduates.

3. Two Contributions of Teacher Preparation Programs: Teacher preparation programs provided degree graduates for the teaching force in two major ways: (a) by preparing teachers for entry (including reentry) to the profession, and (b) by upgrading the degree qualifications of continuing teachers (i.e., employed teachers who continue teaching from one year to the next).

4. Yield of Degree Graduates from Teacher Preparation Programs in 1990: The percentage yield of degree graduates from teacher preparation programs in 1990 for the employed teaching force in public schools was as follows:

	Percentage Yield of Degree Graduates	
	Special Education	General Education
a. Recent graduates entering the teaching force	33%	22%
b. Graduates delaying entry to the teaching force	12%	17%
c. Graduates already employed as teachers	37%	18%
d. Total Yield: Percentage	81%	57%
Number	12,500	74,800

Note: The sum of percentages may not equal the total due to rounding.

5. Degree Graduates from Teacher Preparation Programs in 1990 Who Did Not Enter the Teaching Force: Of the 15,400 degree graduates from teacher preparation programs in 1990 in special education, about 2,900 (19%) did not become public school teachers, while 56,100 (43%) of such graduates from general education programs did not become public school teachers.

The total yield of 81% of degree graduates from teacher preparation programs in special education, and the total yield of 57% of degree graduates from general education programs in 1990, as found here for public schools, raise complex and important issues about whether the level of production of teacher preparation graduates represents an excessive surplus in relation to the demand for qualified teachers to staff the nation's schools. On the basis of a review of these findings in relation to the results of other studies, it was concluded that the production of degree graduates from teacher preparation programs in special education has been insufficient to meet either the demand for numbers of teachers or the demand for fully-certified teachers. The implication for practice of this conclusion is that the production of graduates from teacher preparation programs in special education should be increased dramatically.

On the basis of a similar review, it was concluded that the overall production of general education teachers has not been excessive, but that there could well be overproduction of graduates in some specific teaching fields and geographic locations (and corresponding underproduction in others), as well as a lack of sufficient incentives for many qualified individuals to apply for the teaching positions that happen to be open. Obviously, many research questions remain to be investigated about matching the production of degree graduates from teacher preparation programs with the demand for teachers in the profession.

INTRODUCTION

During the first half of the 1990s, colleges and universities in the United States graduated about 150,000 bachelor's and master's degree students from teacher preparation programs annually (Snyder, Hoffman, & Geddes, 1996). At the same time, there have been reports of serious national shortages of qualified teachers in selected fields as diverse as science education (Gilford & Tenenbaum, 1990) and special education (Boe, Cook, Bobbitt, & Terhanian, 1996). It is possible that such shortages might caused by an insufficient production of degree graduates by teacher preparation programs to meet demand, at least in teaching fields such as special education, or because of the unwillingness of many such graduates to accept specific teaching positions for which they have become qualified. Information about the percentage of degree graduates from teacher preparation programs who actually become employed as teachers (i.e., yield) would help answer this question. If the yield is high and shortages persist, then production of graduates needs to be increased to meet demand. If, however, yield is low, then graduates have not become employed as teachers in sufficient numbers to eliminate shortages--in which case, education policy makers and administrators should devote attention to improving the incentives for becoming teachers. Of course, it is possible that both of these factors could be involved in producing teacher shortages.

Though recent degree graduates from teacher preparation programs constitute one of several major sources of teacher supply, virtually nothing is known from a national perspective about the percentages of such graduates who (a) enter public school teaching soon after graduation, (b) delay entering public school teaching for one or more years after graduation, or (c) already hold public school teaching positions at the time of degree completion. Although information from North Carolina demonstrated that 59% of all newly-licensed first-time teachers became employed as public school teachers within three years of licensure (Murnane, Singer, Willett, Kemple, & Olsen, 1991), this study did not differentiate between individuals with and without teacher training, between licenses earned by entering versus continuing teachers, and between those hired in North Carolina versus those hired in other states. As observed by Murnane et al., the latter circumstance is one consideration that restricts generalizations to the national level.

With incomplete state data and the absence of national data, the purpose of this research was to investigate the yield of degree graduates from teacher preparation programs for public schools nationally. In view of widespread concerns about shortages of qualified special education teachers (Boe, Cook, Bobbitt, & Terhanian, 1996), yield was examined separately for special education and for general education teacher preparation programs.

An analysis of the placement of degree graduates from teacher preparation programs is of significance for the teaching profession for several reasons. Information about the yield of such graduates will be valuable in assessing the productivity of this sector of higher education and assessing the role it performs in the production of teachers. On the one hand, there may be a shortage of graduates from teacher preparation programs such that graduates from other programs must be hired to fill a void. Alternatively, there may be a surplus of teacher preparation graduates in relation to available positions such that overproduction squanders resources, and many aspiring teachers are frustrated in their attempts to attain career goals. Yet another possibility is that much of the productivity of teacher preparation programs goes into upgrading the degree qualifications of already practicing teachers instead of into producing candidates for entering the profession for the first time. Finally, it is possible that the production of degree graduates by teacher preparation programs is close to optimal in relation to what is needed by the profession considering other sources of teacher supply. This research was designed to produce national data relevant to assessing these various possibilities in the public school teaching force.

METHOD

Data Sources

One source of data for this research was the Integrated Postsecondary Education Data System (IPEDS) of the National Center for Education Statistics (NCES) of the U.S. Department of Education. This data base includes information about a wide variety of variables for the population of colleges and universities, faculty, and students in the United States, and it is updated annually. IPEDS data used here were the number of annual degree graduates from teacher preparation programs in special education and in general education during 1977 through 1993. More detailed information about IPEDS is provided by Broyles (1994).

The second source of data was teachers' self reports to the Public School Teacher Questionnaires (PSTQ) of the 1987-88 and 1990-91 Schools and Staffing Surveys (SASS), also conducted by NCES. Information from PSTQ was used in this research to identify

employed teachers who had completed degree study with majors in teacher preparation specializations. Such graduates were analyzed as a function of various sources of teacher supply.

The PSTQ data were obtained from two large national-probability samples of K - 12 teachers (N = 40,521 teachers in early 1988 and N = 46,599 teachers in early 1991) with high response rates (86% in 1988 and 91% in 1991). Therefore, this data base provides nationally representative estimates of the numbers and attributes of public school teachers in each of the two survey years, including sources of teacher supply (e.g., entering first-time teachers, reentering experienced teachers, private school migrants, etc.) and their major fields of study. More detailed information about the SASS is found in an overview published by NCES (1996), and in technical descriptions published by NCES (e.g., see Choy, Medrich, Henke, & Bobbitt, 1992, Appendix A for the 1987-88 SASS, and Choy, Henke, Alt, Medrich, & Bobbitt, 1993, Appendix C, for the 1990-91 SASS).

Teacher Sample

In keeping with the SASS definition, a teacher was any individual employed either full-time or part-time at a public school who reported his/her main assignment as teaching in any grade(s) K - 12, including itinerant teachers and long-term substitutes. Excluded from this definition of a teacher were individuals who identified their main assignment as pre-kindergarten teacher, short-term substitute, student teacher, teacher aide, or a non-teaching specialist of any kind.

For the purposes of this research, all public school teachers were classified into two main teaching fields: special education and general education. Special education teachers (SETs) were defined as public school teachers (K - 12) whose main teaching assignment during the years of the two surveys was in any one of a variety of teaching specializations within special education. General education teachers (GETs) were then defined as all public school teachers (K - 12) other than SETs.

The sizes of the samples of SETs and GETs used in this research are presented in Table 1 of the results and discussion section.

Design

The research was designed to analyze, from a national perspective, the yield of degree graduates from teacher preparation programs in special and general education for the teaching force employed in public schools during 1987-88 and 1990-91. The yield was analyzed as

a function of three sources of teacher supply: (a) entering teachers (both first-time and experienced teachers) who were recent degree graduates, (b) continuing teachers who were recent degree graduates, and (c) entering first-time teachers who delayed entry to teaching. In addition, these three sources of teacher supply were analyzed as a function of two major fields of study in which the degree was earned: teacher preparation in special education and teacher preparation in general education. The variables analyzed in this study are defined below in relation to data from the 1990-91 PSTQ. The same definitions were used for the 1987-88 PSTQ, with the dates appropriate to that survey period.

1. Sources of Teacher Supply. Three sources of teacher supply for the 1990-91 school year were studied, as follows:
   a. Entering teachers with recent degrees. Entering teachers with recent degrees were defined as those (a) who were not teaching in public schools during 1989-90, but who were employed as teachers in a public school during the subsequent year--1990-91, and (b) who had earned a degree from a teacher preparation program at the bachelor's or master's levels during the year prior to entry (i.e., calendar year 1990). Such entering teachers are sometimes referred to as "recent graduates." They included many who were first-time teachers (i.e., entering teachers without prior teaching experience), and others who were experienced teachers (i.e., entering teachers with prior teaching experience in any field).
   b. Continuing teachers with recent degrees. Continuing teachers were defined as teachers who were employed in a public school during 1989-90, and who continued teaching in a public school during 1990-91. The subset of continuing teachers studied here included only teachers with recent degrees from teacher preparation programs, namely those who had earned such degrees at the bachelor's or master's levels during the prior year (i.e., in calendar year 1990).
   c. Entering first-time teachers without recent degrees. Another group of entering teachers studied here included first-time teachers who had earned a degree from a teacher preparation program at either the bachelor's or master's level more than one year prior to entry to the teaching force (i.e., degree earned prior to calendar year 1990). These entering teachers had delayed their entry to the employed teaching force by one or more years after earning such degrees--a group sometimes referred to as "delayed entrants."
2. Major field of study. The number of continuing and entering teachers who earned degrees from teacher preparation programs at either the bachelor's and master's levels were

classified into two categories according to their major field of study: (a) special education or (b) general education.

3. Yield of degree graduates from teacher preparation programs for public schools. The total yield of degree graduates from teacher preparation programs in special education and degree graduates from teacher preparation programs in general education was defined as the percentage of graduates from such programs who attained employment as teachers in public schools. The yield percentage, thus, is an index of the productivity of teacher preparation programs for the employed teaching force. The three components contributing to the total yield percentage were:
   a. The annual yield of graduates from teacher preparation programs who earned a degree in 1990 and who entered the employed teaching force in 1990-91,
   b. The annual yield of graduates from teacher preparation programs who earned a degree in 1990 while serving as employed teachers in 1989-90 and who continued as teachers in 1990-91, and
   c. The annual yield of graduates from teacher preparation programs who earned a degree prior to 1990 and who delayed entry to the employed teaching force until 1990-91.

Operational definitions of variables analyzed in this research are available upon request from the senior author.

Analysis Procedures

Based on the sample sizes reported in Table 1, weighted national estimates of the numbers of teachers (as well as their percentages and standard errors) were computed by special procedures developed by NCES for complex sample survey data (Kaufman & Huang, 1993). These national estimates were used in the statistical analyses testing for associations among variables. Because SASS data are subject to design effects due to stratification and clustering of the sample, standard errors for the national estimates were computed using the method of balanced repeated replications.

RESULTS AND DISCUSSION

To facilitate the presentation of the results of this research on the yield of degree graduates from teacher preparation programs in special and general education, the results are presented and discussed as responses to four main questions. Parallel analyses were made for SETs and GETs separately to permit comparisons between these two main teaching fields.

Parallel analyses were also made separately for two years (1987 and 1990) to permit assessment of the stability in the results over time.

How large was the annual supply of degree graduates from teacher preparation programs?

To assess the yield of degree graduates from teacher preparation programs for the teaching force (i.e., the percentage of such graduates who become employed as teachers), it is necessary first to determine the number of such graduates each year. These numbers, as provided by IPEDS, are shown by year in Figure 1.

As seen in Figure 1, teacher production in both special education and general education declined steadily from 1977 to a low point in the mid-1980s. Since then, the number of graduates each year has increased somewhat to approximately 18,000 degree graduates in special education and 145,000 graduates in general education during 1993.

Also shown in Figure 1 is the relationship between the numbers of bachelor's and master's graduates. A striking difference between special and general education is that the number of master's degree graduates has been roughly equivalent to the number of bachelor's graduates in special education, while in general education master's graduates have been considerably less than half of the graduates at the bachelor's level. This finding is consistent with other research which has found that a higher percentage of employed SETs have earned a master's degree (53%) than have GETs (43%) (Cook & Boe, 1995). It appears that SETs are somewhat more qualified than GETs with respect to the highest degree earned--a fact that can be linked to the much higher percentage of master's graduates from teacher preparation programs in special education.

Contrary to what might be assumed, the number of degree graduates from teacher preparation programs shown in Figure 1 does <u>not</u> represent the annual supply of such graduates who are potentially available to be hired as entering teachers. This is because an unknown number of these graduates are already employed as teachers at the time of degree completion (i.e., continuing teachers) and because an unknown number of the remainder are not available, at least immediately upon graduation, to be hired as teachers (e.g., some will continue their education instead of attempting to enter teaching). Therefore, more important than information about the production of graduates from teacher preparation programs is information about the yield of these graduates for the employed teaching force.

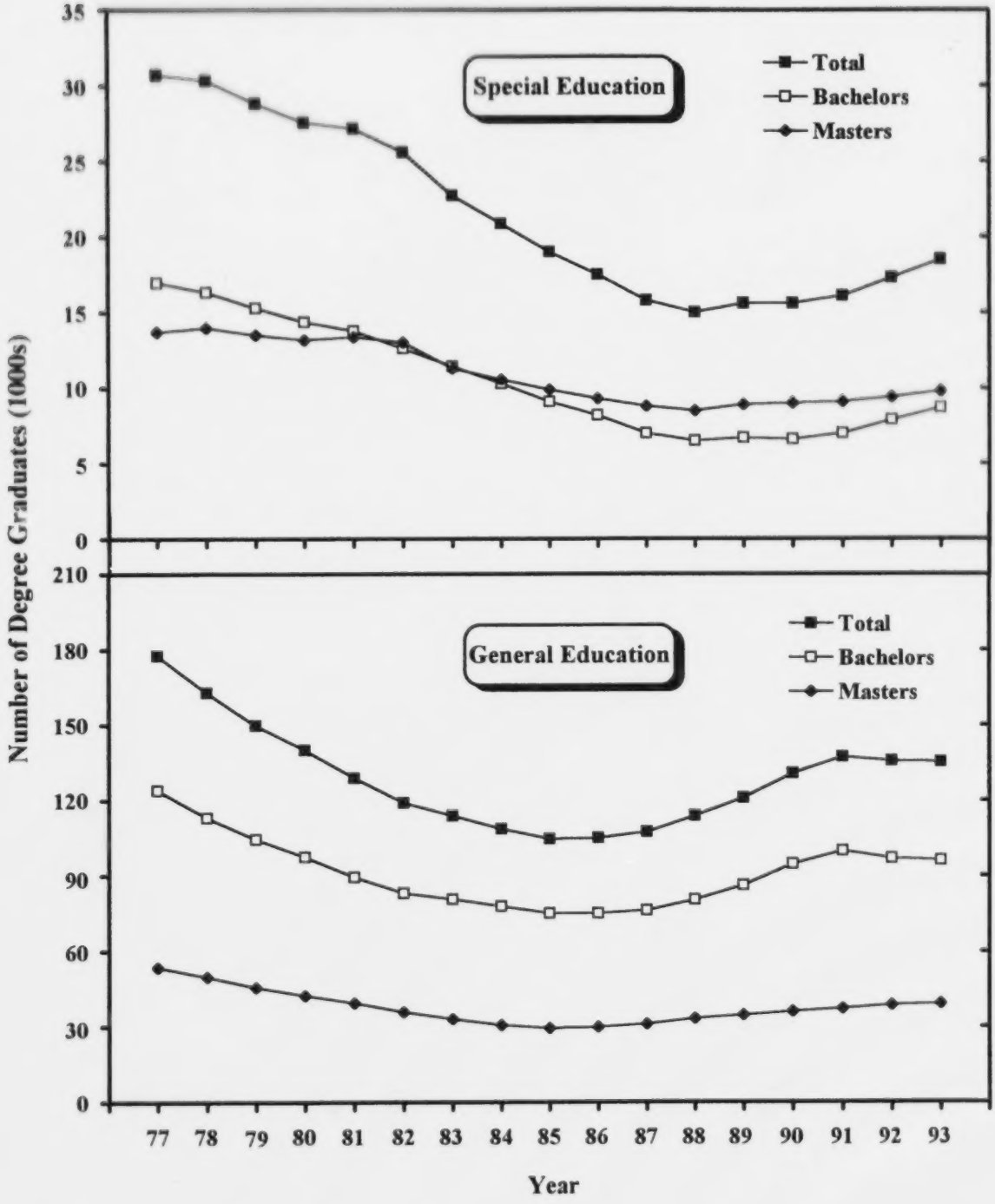

Figure 1. Number of graduates (thousands) of teacher preparation programs in special education and in general education as a function of year and degree level. Data from the Integrated Postsecondary Education Data System (IPEDS) of the National Center for Educational Statistics, USDE.

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How large was the yield of graduates from teacher preparation programs for the employed teaching force?

The yield of degree graduates from teacher preparation programs in 1987 and 1990 for public schools is shown in Table 1. Also presented in Table 1 are three components of yield for public schools: (a) all graduates who recently (i.e., within the prior year) earned degrees (both first-time teachers and reentering teachers with prior teaching experience), and entered the profession soon after graduation, (b) all graduates who recently earned degrees while serving as employed teachers, and who continued as teachers after graduation, and (c) all graduates who delayed initial entry to the teaching force by more than one year following degree completion. The first two components of yield pertain specifically to the short-term (i.e., annual) yield of graduates for the teaching force, while the third component pertains specifically to the long-term (i.e., delayed) yield of graduates from all prior years combined. The contribution of each of these three components to yield was computed as a percentage of total degree graduates during the relevant one-year time periods studied (i.e., graduates during 1987 and during 1990, as shown in Figure 1).

The yield results were roughly similar for the two time periods for general education as reported in Table 1 (1987 and 1990). The apparent difference in the total yield percentages from special education programs between 1987 and 1990 could be influenced by the small sample sizes for the delayed yield data for first-time teachers. Until additional data become available for more recent years to show whether, in fact, there is a trend toward increased hiring of delayed entrants from special education programs, yield estimates should be based on the most current data (i.e., 1990). Therefore, the discussion below will focus on the yield percentages from 1990 as shown in Figure 2.

Yield of recent graduates who entered teaching. Contrary to what might be expected, only a moderate percentage of recent degree graduates from teacher preparation programs actually entered public school teaching within a year of graduation in 1990 (33% of about 15,400 graduates from special education programs, and 22% of about 130,900 graduates from general education programs). As reported by Boe, Cook, Bobbitt, and Terhanian (1996), these recent degree graduates accounted for only 21% of the total number of entering teachers in 1990-91 (entering SETs and GETs combined). Quite clearly, being hired as a public school teacher soon after completing degree study in a teacher preparation program was not the conventional route for entering the teaching force in public schools during the years studied.

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Table 1

Yield of Degree Graduates from Teacher Preparation Programs for the Teaching Force in Public Schools: National Estimates of the Numbers of Special and General Education Teachers as a Function of Source of Teacher Supply and Year

		Annual Graduates by Teacher Preparation Program*			
		Special Education		General Education	
	Statistic[a]	1987	1990	1987	1990
TOTAL GRADUATES	Number	15,822	15,425	107,442	130,873
YIELD COMPONENTS					
Annual Yield					
1. Entering Teachers	Nat. Est.	4,032	5,095	21,976	28,483
	SE Est.	621	784	1,131	1,886
	Sample(n)	67	86	376	597
	Yield %	25%	33%	20%	22%
2. Continuing Teachers	Nat. Est.	6,039	5,640	26,439	24,100
	SE Est.	667	697	1,438	1,722
	Sample(n)	101	108	428	434
	Yield %	38%	37%	25%	18%
Subtotal: Annual Yield	Yield %	63%	70%	45%	40%
Delayed Yield					
3. Entering First-Time Teachers	Nat. Est.	_[b]	1,810	11,660	22,174
	SE Est.	_	463	920	1,532
	Sample(n)	16	30	205	464
	Yield %	5%	12%	11%	17%
Total Yield	Nat. Est.	10,809	12,545	60,075	74,757
	SE Est.	1,046	1,099	1,965	3,017
	Sample(n)	184	224	1,009	1,495
	Yield %	68%	81%	56%	57%

Note. Data from the 1990-91 Schools and Staffing Survey and the Integrated Postsecondary Education Data System (National Center for Education Statistics, USDE).

[a]Nationally weighted estimates (Nat. Est.) of the numbers of full-time and part-time teachers combined at the K-12 levels in the public sector based on the survey sample size (n). SE = standard error. Total Yield % does not add exactly due to rounding.

[b]Sample too small (<30) for computing a reliable estimate.

*For 1987-88, the yield component by teacher preparation program field (3x2) χ^2 is 18.77 ($p < .001$); for 1990-91, the degree yield by teacher preparation program field (3 x 2) χ^2 is 14.43 ($p < .001$).

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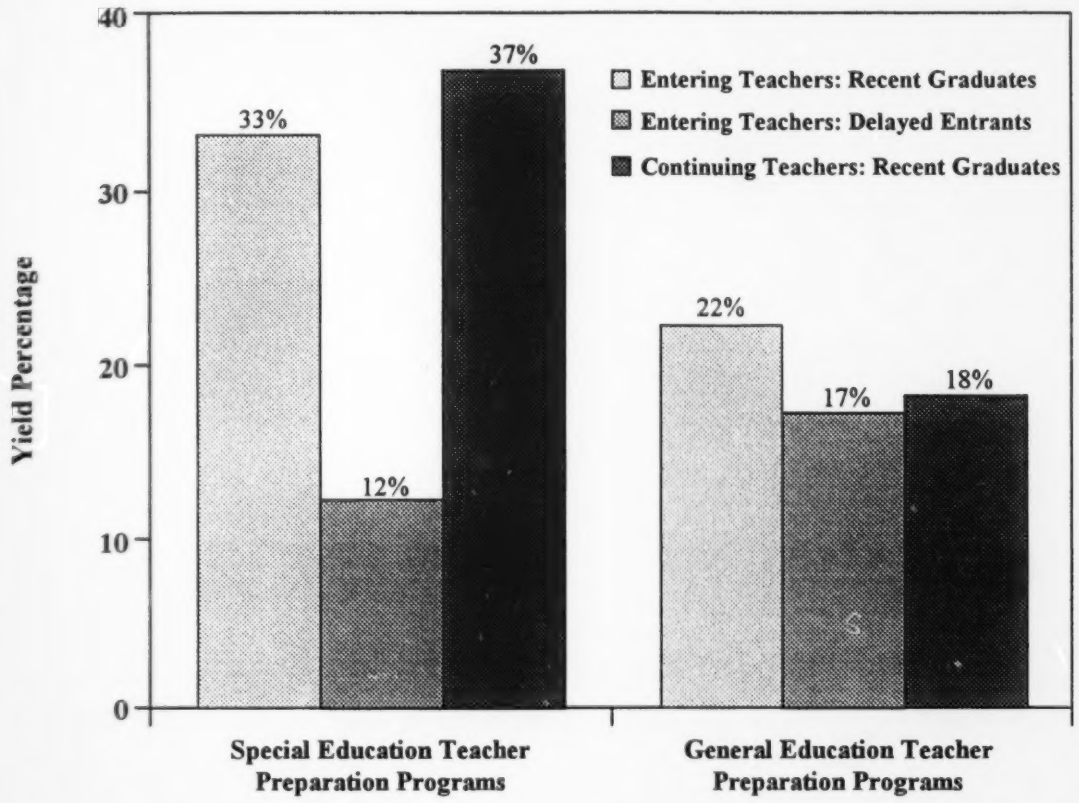

Figure 2. Yield percentages from teacher preparation programs in special and general education for the teaching force in public schools in 1990-91 for (a) entering teachers who earned degrees in 1990 (i.e., recent graduates), (b) entering first-time teachers who earned degrees prior to 1990 (i.e., delayed entrants), and (c) continuing teachers who earned degrees in 1990 (i.e., also recent graduates). Data Sources: The 1990-91 Schools and Staffing Survey and the Integrated Postsecondary Data System (National Center for Education Statistics, USDE).

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Yield of recent graduates who were already employed as teachers. Also contrary to what might be expected, a considerable percentage of recent degree graduates from teacher preparation programs were already employed as public school teachers at the time of graduation (37% of about 15,400 graduates from special education programs, and 18% of about 130,900 graduates from general education programs). From the perspective of the annual production of degree graduates by teacher preparation programs, it is clear that upgrading the degree credentials of already practicing teachers, as well as producing a cohort of entering teachers, are important immediate contributions to the teaching profession.

Yield of delayed entrants to teaching. In addition to the annual yield of graduates from teacher preparation programs, there is also the longer-term yield of first-time teachers who delayed their entry to public school teaching by at least one year following graduation (12% from special education programs, and 17% from general education programs). Delayed yield is obviously a major component of the productivity of teacher preparation programs for the employed teaching force--a component that often pays off many years after degree completion. Further analyses of these data demonstrated that most delayed entrants did not wait an extended period of time before entering teaching: 44% waited only one year, 14% waited two years, and 6% waited three years to enter teaching. Beyond this cumulative 64% of delayed entrants who waited only one to three years to enter, the delay gradient stretched back many years, with 10% of delayed entrants having waited 15 years or more before entering public school teaching. However, long delays to enter teaching (such as more than three years) raise serious questions about the qualifications of such entrants to assume teaching positions. Except for those who have been employed as teachers in private schools, it is likely that they will have forgotten much of what they learned about their subject matter and teaching practice, and that much of what they do remember will have become obsolete with subsequent advances in knowledge and practice.

A methodological note to the estimate of delayed yield as reported in Figure 2 is that, instead of being based on longitudinal data showing the cumulative percentages of graduates who entered the teaching force in each year following graduation in 1990, it was actually based on the yield of first-time teachers in 1990 who were delayed entrants from among graduates from all years prior to 1990. In the absence of longitudinal data, the latter estimate was assumed to be the most reasonable projection of delayed entry of 1990 graduates.

Do special and general education teacher preparation programs differ in the yield of degree graduates?

It can be seen in Table 1 that the total yield of public school teachers from among 1990 graduates was much higher from special education teacher preparation programs (81%) than from general education programs (57%); that is, a much higher percentage of graduates from special education programs secured teaching employment in public schools than did graduates from general education programs. This difference in overall yield between special and general education degree programs was driven mostly by the number of degrees earned by continuing teachers (as noted above, 37% yield from special education programs as compared to 18% yield from general education programs). An explanation for this difference could be the remarkably high percentage of teachers with their main teaching assignment in special education who have not earned a teacher preparation degree in special education (24%, according to Boe, Cook, Bobbitt, & Weber, 1996) and who then completed this credential while on-the-job in order to qualify for full certification.

There was also a considerably higher annual yield of entering teachers from special than from general education programs (33% vs 22%) and a lower delayed yield from special than from general education programs (12% vs 17%). These differences are most likely attributable to the greater opportunities for employment as teachers in special than in general education, i.e., greater opportunities relative to the size of the teaching forces in these two fields (Boe, Cook, Kaufman, & Danielson, 1996). Thus it appears that a higher percentage of recent graduates from special education degree programs were able to secure employment and, therefore, fewer such graduates had to wait for a suitable opening to become available. Greater opportunity to enter teaching positions in special education is also suggested by the considerable number of teachers entering this field who were prepared in general education (Boe, Cook, Bobbitt, & Weber, 1996).

How many graduates from teacher preparation programs did not become employed as teachers?

As shown in Table 1, out of 15,400 graduates from teacher preparation programs in special education in 1990, an estimated total of about 12,500 (81%) were either employed, or would become employed, as teachers in public schools. Therefore, about 3,000 (19%) of these graduates would not secure such employment. Likewise for degree programs in general education, out of 131,000 graduates in 1990, an estimated total of about 75,000 (57%) were either employed, or would become employed, as teachers in public schools--leaving

about 56,000 graduates (or 43%) who would not secure such employment. It is important to recognize, however, that 14,000 degree graduates from teacher preparation programs (1,000 from special education and 13,000 from general education programs) in 1990 who did not enter public school teaching did enter private school teaching (Boe, 1997). Thus, including the yield of graduates for private school teaching, an estimated 45,000 graduates (31% out of about 146,000 total graduates) would not become employed as teachers in either public or private schools.

These numbers, especially in general education, raise the possibility that a surplus (i.e., overproduction) of teachers is being prepared annually in relation to demand. Alternatively, questions can be raised about whether the reasons why thousands of degree graduates do not become practicing teachers are due to (a) under-hiring of these degree graduates by school districts, or (b) disinclination by these graduates to take available teaching positions due either to unacceptable geographic location, type of school district, temporary or part-time status of available open positions, or other factors. Since there are no national or state data on the characteristics of applicants for teaching positions, it is not possible to determine whether an adequate number of degree graduates apply for positions within districts, but are not hired, or whether many degree graduates simply do not apply for available positions. What is known based on the findings of a different study (Boe, Cook, Bobbitt, & Terhanian, 1996) is that there is much hiring of entering teachers who are not fully certified in their main teaching assignments (34,000 of the 158,000 entering teachers hired in 1990-91), and that many continuing teachers are likewise not fully certified in their main teaching assignments (118,000 of 2,393,000 continuing teachers in 1990-91). Presumably, many degree graduates from teacher preparation programs who did not secure teaching positions should have been hired in place of those who were not fully certified in their assignments.

Of course, an argument can be made that annual overproduction of degree graduates is constructive because many graduates who are not hired soon after graduation become part of the reserve pool (which includes also individuals with prior teaching experience) from which most entering teachers are actually hired (Rollefson & Broughman, 1995). However, this provides little comfort to recent graduates who have invested educational resources in a career, but find upon graduation that a suitable position is not available. It is also not advantageous for the profession to become increasingly dependent on hiring delayed entrants from the reserve pool to fill open teaching positions because of evidence of their lower qualifications for these positions. As reported by another study (Boe, Cook, Bobbitt, & Terhanian, 1996) based on national data for 1990-91, the percentage of delayed entrants

lacking full certification in their main teaching assignment was quite high. For teaching assignments in special education, 68% of delayed entrants lacked full certification in comparison with only 21% of recent graduates from teacher preparation programs; for teaching assignments in general education, 28% of delayed entrants lacked full certification in comparison with only 16% of recent graduates from teacher preparation programs.

Too many graduates of teacher preparation programs, or not enough?

Given a total yield of 81% of degree graduates from teacher preparation programs in special education and a total yield of 57% of degree graduates from general education programs in 1990 as reported here for public schools, it is important to address the question of whether the production of such graduates is too much or too little in relation to the demand for qualified teachers to staff the nation's schools. To address this question, it is necessary to refer to results from other studies which have investigated several aspects of the demand for teachers. Perspectives on this question will be considered first for special education and next for general education.

Out of a total of about 15,400 graduates from teacher preparation programs in special education in 1990 (see Table 1), about 5,600 were already employed as teachers--leaving a net of only 9,800 graduates potentially available to meet the demand for 23,000 entering SETs during the same year (Boe et al., 1996), less than half of the number needed. To meet this demand for 23,000 entering teachers in special education, 58% were recruited from among individuals with prior teaching experience and an additional 18% were first-time teachers who had delayed entry to teaching (Boe et al., 1996)--both promising sources of supply to the extent that such teachers are fully-certified in an area of specialization in special education. However, 40% of entering teachers in special education in 1990-91 had not earned degrees from teacher preparation programs in special education (some of these majored in general education, and others in a wide variety of fields other than teacher preparation) (Boe, Cook, Bobbitt, & Weber, 1996). Fewer than half of these entrants from fields other than special education were fully-certified in their main teaching assignments upon entry. Clearly, there was an insufficient supply of qualified individuals, such as recent graduates from teacher preparation in special education, available to assume open teaching positions in special education.

In addition to a shortage of fully-certified entering SETs (7,400), there was also a shortage of fully-certified continuing SETs (19,400) in 1990-91--creating a total 27,000 (9.8% of the employed teaching force of 274,000) who were not fully-certified in their main

teaching assignment (Boe, Cook, Bobbitt, & Terhanian, 1996). Obviously, these teachers either should attain full certification or be replaced with teachers who have earned this basic qualification. Unfortunately, the production of approximately 15,400 annual degree graduates from teacher preparation programs in special education was insufficient to reduce the shortage of 27,000 fully-certified employed SETs in 1990-91. Furthermore, the storage of 27,000 fully-certified employed SETs has been chronic at this level from 1985-86 through 1994-95 (Boe, Cook, Bobbitt, & Terhanian, 1996).

Given these findings on the shortages of SETs among both entering and continuing teachers, it is concluded that the production of degree graduates from teacher preparation programs in special education has been insufficient to meet either the demand for numbers of teachers or the demand for fully-certified teachers. The implications for practice of this conclusion is that the production of graduates from teacher preparation programs in special education should be increased dramatically. To meet the combined shortages of fully-certified entering and continuing SETs, a doubling of the annual production of degree graduates from teacher preparation programs in special education could be expected to reduce the demand substantially over a period of years.

Addressing next the production of degree graduates from teacher preparation programs in general education, it is more difficult to assess whether there have been too many or too few graduates. The fairly low total yield percentage (57%) for public schools (even with an upward adjustment to about 67% allowing also for private school entrants) suggests that considerably more general education graduates were produced than could find teaching positions. This conclusion is buttressed by the facts that (a) many such graduates do not enter the teaching force within a year of graduation (i.e., they are delayed entrants), and (b) many individuals with preparation to teach in general education take positions in special education (Boe, Cook, Bobbitt, & Weber, 1996)--both signs that not enough positions in general education were readily available.

On the other hand, there was a shortage of about 126,000 GETs who were fully-certified in their main teaching assignments in 1990-91 (Boe, Cook, Bobbitt, & Terhanian, 1996). Yet, as suggested by the results of this study, about 43% (56,000) of the 131,000 graduates in general education will never become employed as teachers in public schools. How might it be that there is a demand for 126,000 fully-certified GETs, while 56,000 annual degree graduates in general education will never become employed as teachers in any field? One reasonable possibility is that there was overproduction in some teaching fields of general education, and underproduction in others. In addition, many graduates may elect not to

accept available teaching positions unless they are located in preferred districts. For example, Eubanks (1996) has reported high demand for teachers in most fields of general education (as well as in special education) in a survey of 47 large urban districts represented in the Council of Great City Schools. These facts suggest that the overall production of general education teachers is not excessive, but that there could well be overproduction of graduates in some specific teaching fields and geographic locations (and corresponding underproduction in others), as well as a lack of sufficient incentives for many qualified individuals to apply for open teaching positions that are available. Obviously, much remains to be learned about matching the production of degree graduates in teacher preparation with the demand for teachers in the profession.

CONCLUSION

This research focused on the yield of degree graduates from teacher preparation programs for the national teaching force in public schools, and the results are the first of this type to be reported. The findings on the yield of such graduates for the employed teaching force, based on data from two large national-probability sample of teachers from the 1987-88 and 1990-91 school years, were similar for the two years studied--thereby providing substantial evidence of their reliability. Therefore, this study is the first to demonstrate a feasible and promising method for investigating a major aspect of the productivity of teacher preparation programs nationally for the teaching profession.

The study, though, is subject to the usual limitations inherent in data obtained from cross-sectional surveys such as SASS. For example, the estimation of delayed yield of entering teacher ideally would be obtained from longitudinal data showing the cumulative percentages of graduates who entered the teaching force in each year following graduation. Since such data are not available from cross-sectional surveys, estimates were made here about the yield of first-time teachers in 1990 who were delayed entrants from among graduates from all years prior to 1990. Unfortunately, longitudinal survey data have not been available to study the delayed yield of entering teachers. Even NCES's new Baccalaureate and Beyond Longitudinal Survey can only be used to study the annual and delayed yield of bachelor's degree graduates (but not master's degree graduates) of teacher preparation programs (Henke, Geis, Giambattista, & Knepper, 1996), and the followup period is still too short for tracking delayed entrants from among bachelor's graduates. In special education, these longitudinal data for bachelor's graduates represent but half the production of degree graduates of teacher

preparation programs since a comparable number of masters graduates are also produced (see Figure 1). Thus, the method for investigating yield as demonstrated by this study and that based on NCES's new longitudinal data are complementary.

This study is also subject to another limitation. Although the productivity of teacher preparation programs includes both (a) degree graduates at the bachelor's and master's levels with majors in specific teaching specializations, and (b) others who qualify as teachers through certification programs but with majors in other fields, it is not possible to study the latter form of productivity in national perspective because of the absence of data. Though the size of this group constitutes an important, but unknown, contribution by teacher preparation programs, it could not be included in this research.

As the first national study on the productivity of degree graduates of teacher preparation programs for meeting the demand for qualified teachers in the profession, the results raise a number of questions for further research. For example, how does the yield of teachers vary by (a) degree field (e.g., for general elementary education, social studies, physical education, science education, etc.), (b) degree level (bachelor's and master's), (c) sector (public and private schools), and (d) demographic characteristics of the degree graduates (e.g., sex and race)? In addition, the data on the relatively high level of entering teachers who are not fully certified in their main teaching assignment (Boe, Cook, Bobbitt, & Weber, 1996; Rollefson & Broughman, 1994) represent a significant problem that could be due to hiring many entering graduates from teacher preparation programs into teaching assignments for which they were not prepared (i.e., out-of-field placement), or due to inadequate preparation, or both. Finally, how much do the qualifications of graduates who delay entry into teaching deteriorate during the time elapsed between the dates of graduation and entry to the teaching force? Research-based information relevant to questions such as these would contribute greatly to improved understanding of the productivity of teacher preparation programs, and could more precisely suggest teaching fields in which production should be increased, decreased, or otherwise adjusted.

REFERENCES

Boe, E. E. (1997). [Yield of graduates from teacher preparation programs]. Unpublished raw data.

Boe, E. E., Cook, L. H., Bobbitt, S. A., & Terhanian, G. (1996). The shortage of fully-certified teachers in special and general education (Research Rep. 1996-TSD2). Philadelphia: University of Pennsylvania, Graduate School of Education, Center for Research and Evaluation in Social Policy.

Boe, E. E., Cook, L. H., Bobbitt, S. A., & Weber, A. L. (1996). The influx of teachers prepared in general education into special education: Impact on teacher demand and shortage (Research Rep. 1996-TSD3). Philadelphia: University of Pennsylvania, Graduate School of Education, Center for Research and Evaluation in Social Policy.

Boe, E. E., Cook, L. H., Kaufman, M. J., & Danielson, L. (1996). Special and general education teachers in public schools: Sources of supply in national perspective. Teacher Education and Special Education, 19, 1-16.

Boe, E. E., & Gilford, D. M. (Eds.) (1992). Teacher supply, demand, and quality: Policy issues, models and data bases. Washington, DC: National Academy Press.

Broyles, S. (1994). Integrated Postsecondary Education Data System (IPEDS) (NCES 94-664). Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Choy, S. P., Henke, R. R., Alt, M. N., Medrich, E. A., & Bobbitt, S. A. (1993). Schools and Staffing in the United States: A Statistical Profile, 1990-91. Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Choy, S. P., Medrich, E. A., Henke, R. R., & Bobbitt, S. A. (1992). Schools and Staffing in the United States: A Statistical Profile, 1987-88. Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Cook, L. H., & Boe, E. E. (1995). Who is teaching students with disabilities? Teaching Exceptional Children, 28 (1), 70-72.

Eubanks, S. C. (1996). The urban teacher challenge: A report on teacher recruitment and demand in selected Great City Schools. Belmont, MA: Recruiting New Teachers, Inc.

Gilford, D. M., & Tenenbaum, E. (Eds.). (1990). Precollege science and mathematics teachers: Monitoring supply, demand, and quality. Washington, DC: National Academy Press.

Henke, R. R., Geis, S., Giambattista, J., & Knepper, P. (1996). Out of the lecture hall and into the classroom: 1992-93 college graduates and elementary/secondary school teaching. Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Kaufman, S., & Huang, H. (1993). 1990-91 Schools and Staffing Survey: Sample design and estimation (NCES 93-449). Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Murnane, R. J., Singer, J. D., Willett, J. B., Kemple, J. J., & Olsen, R. J. (1991). Who will teach? Policies that matter. Cambridge, MA: Harvard University Press.

National Center for Education Statistics (1996). An overview of the schools and staffing survey (SASS). Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Rollefson, M., & Broughman, S. (1994). Teacher supply in the United States: Sources of newly hired teachers in public and private schools, 1988-1991 (NCES 95-348). Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Snyder, T. D., Hoffman, C. M., & Geddes, C. M. (1996). Digest of education statistics: 1996. Washington DC: National Center for Education Statistics, U.S. Department of Education.